

Mission Design to Access Ocean Worlds

Brent Sherwood

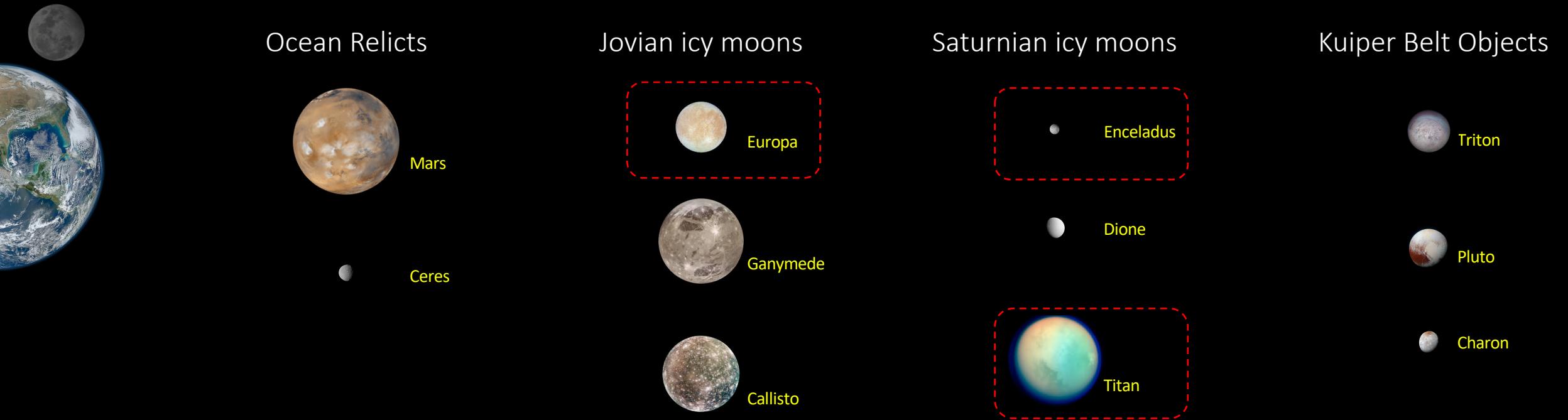
Special Session: Challenges, Technologies, and Solutions
for Exploration of Icy and Ocean Worlds

69th IAC, Bremen 3 October, 2018



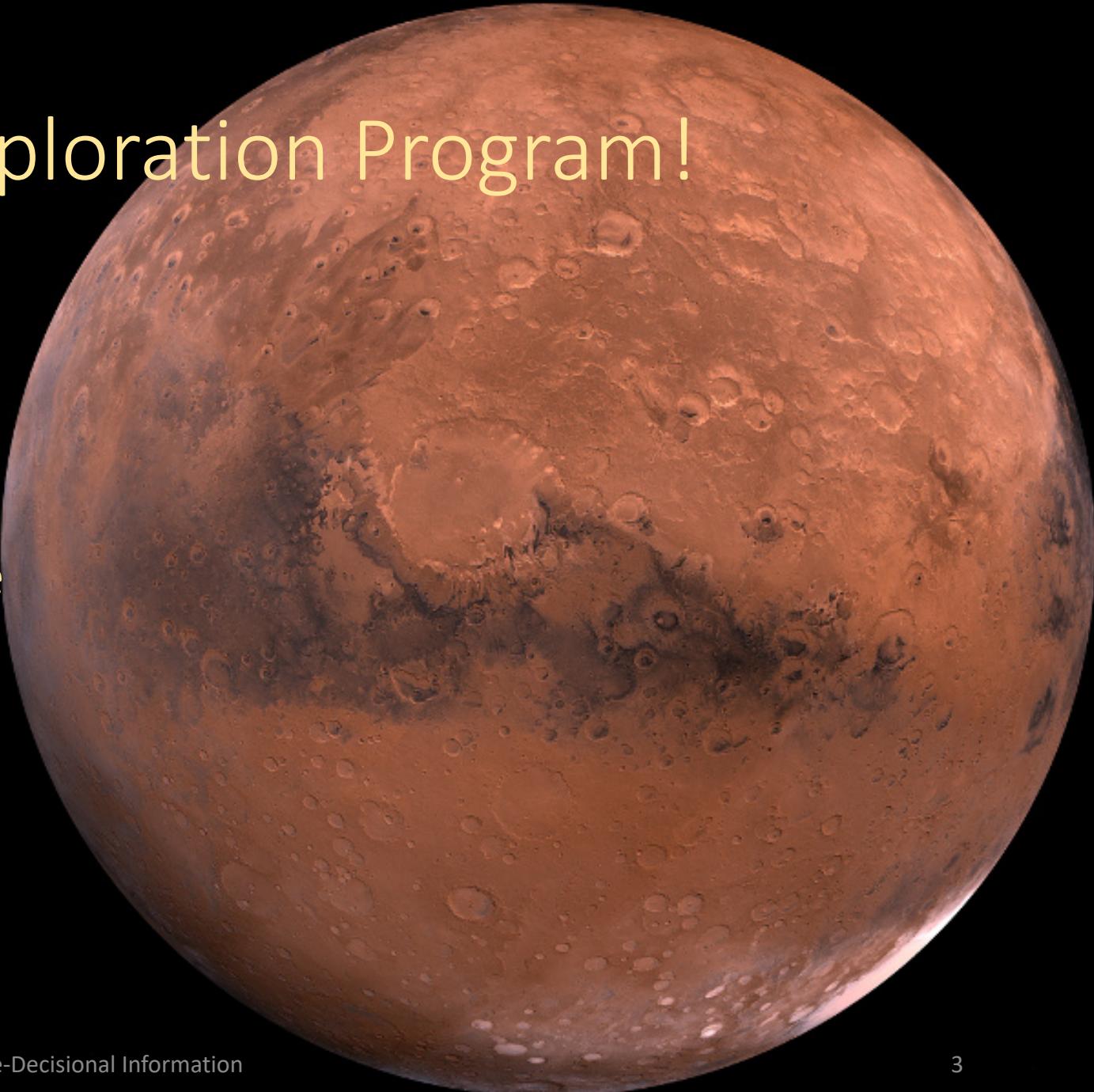
Jet Propulsion Laboratory
California Institute of Technology

More than a dozen ocean worlds within reach



Not like the Mars Exploration Program!

- Neither easy to reach nor technically moderate
- Learning-to-response cadence exceeds half-decade timescale
- What ‘shared operational infrastructure’ could help individual missions?





Heavy-lift launch

- 3 years to Jupiter
- 4 years to Saturn

3 Oct 2018, MD Access OW

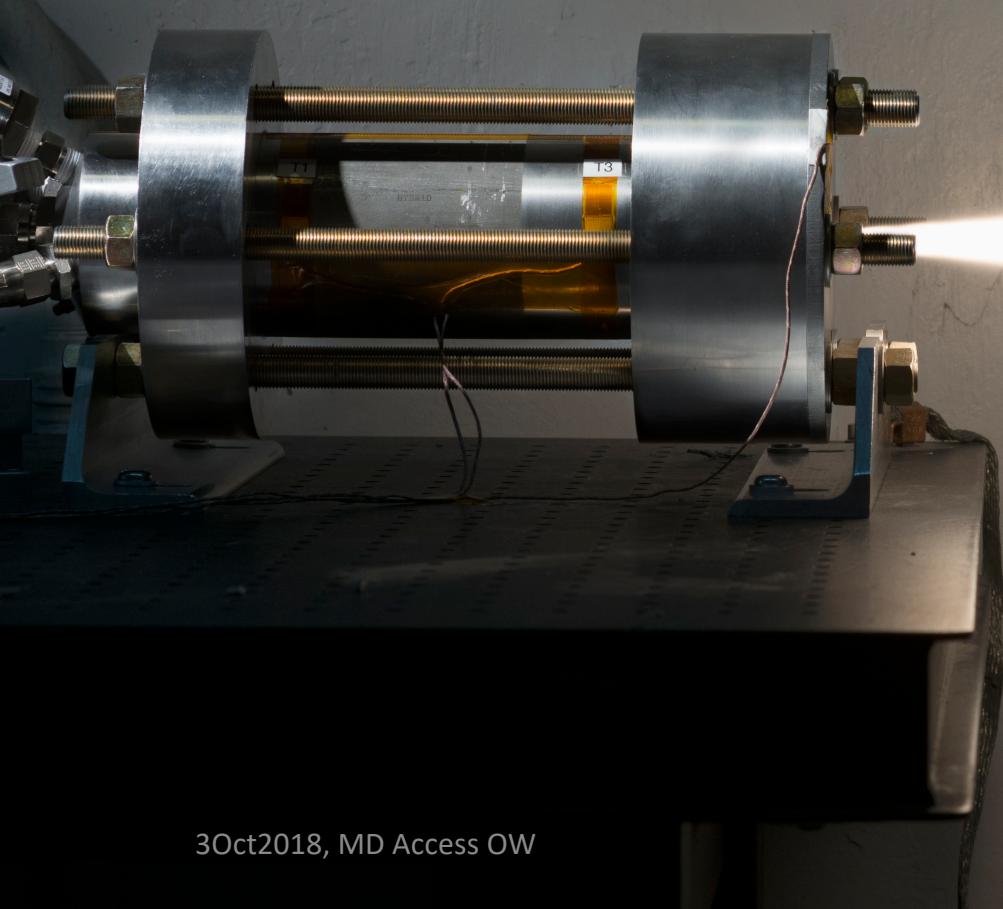
Solar Electric Propulsion

- 25-50 kW-class systems based on commercial capability
- 5-8 years to Saturn with standard LV
- Mission-scalable



Pre-Decisinal Information

Deep Space Hybrid Rocket Motor



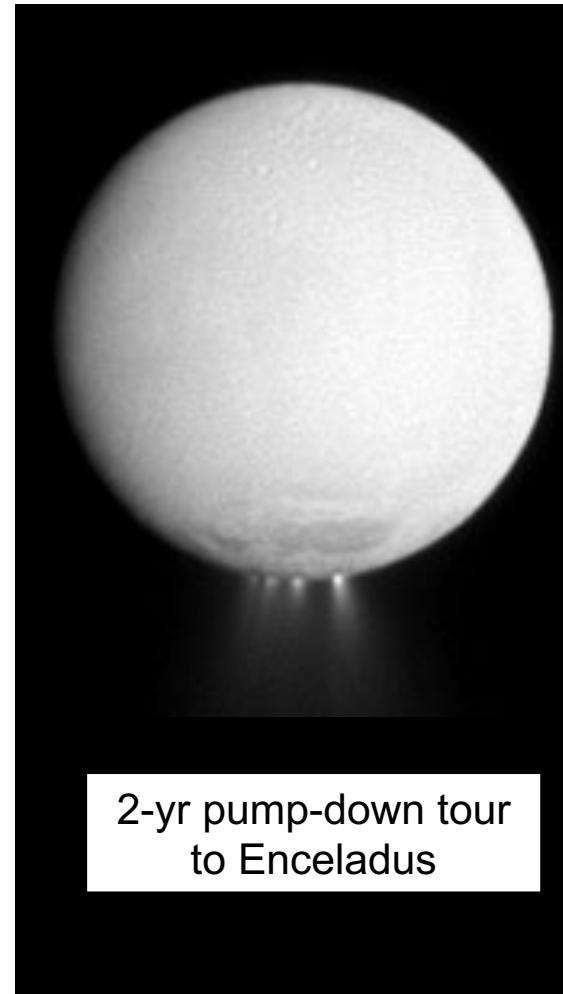
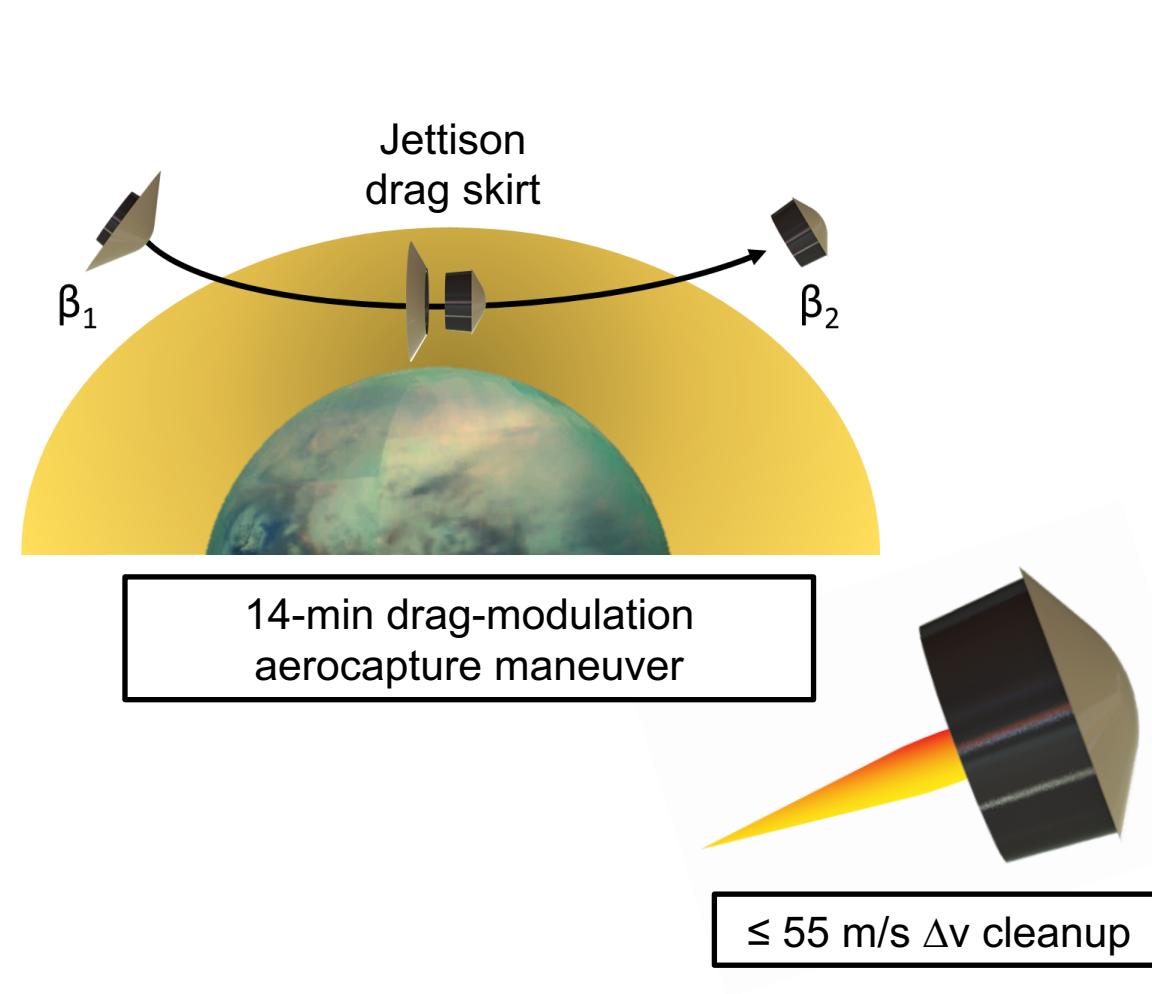
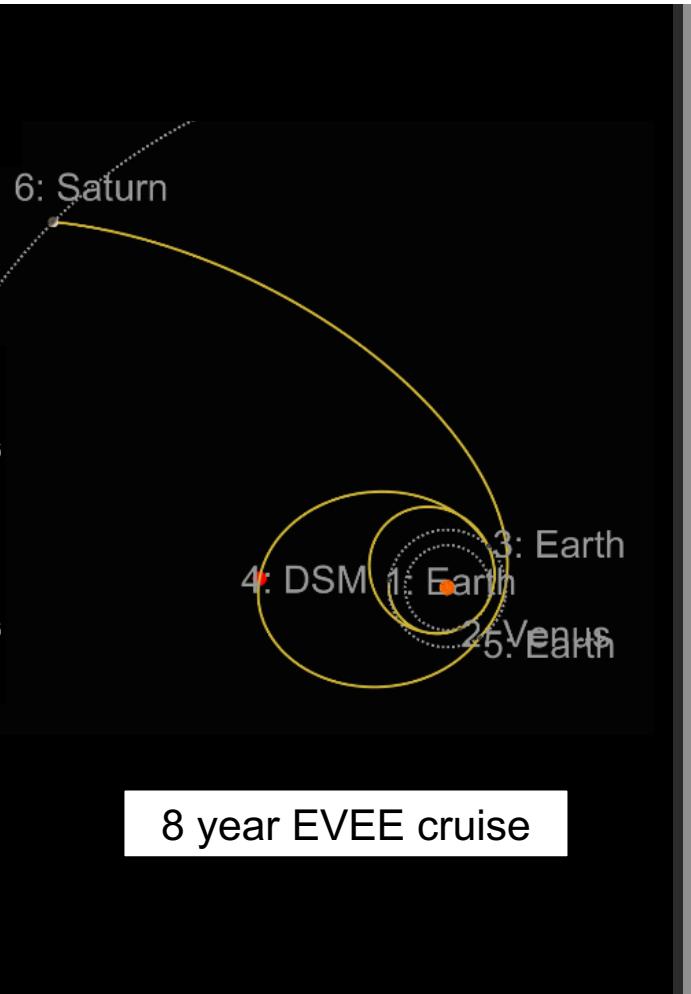
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Pre-Decisinal Information



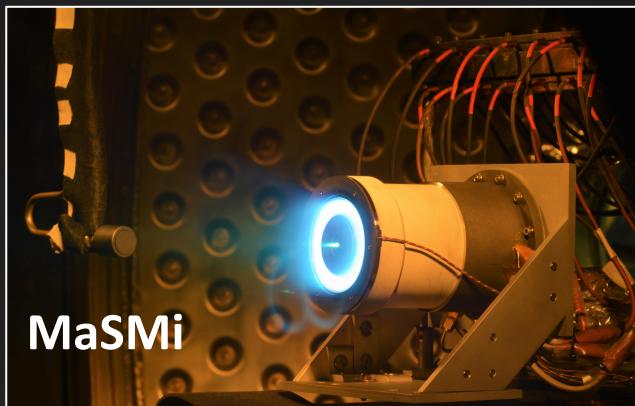
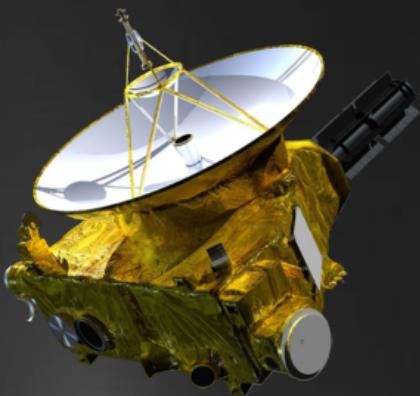
Wax-based solid fuel
5

Titan Aerocapture

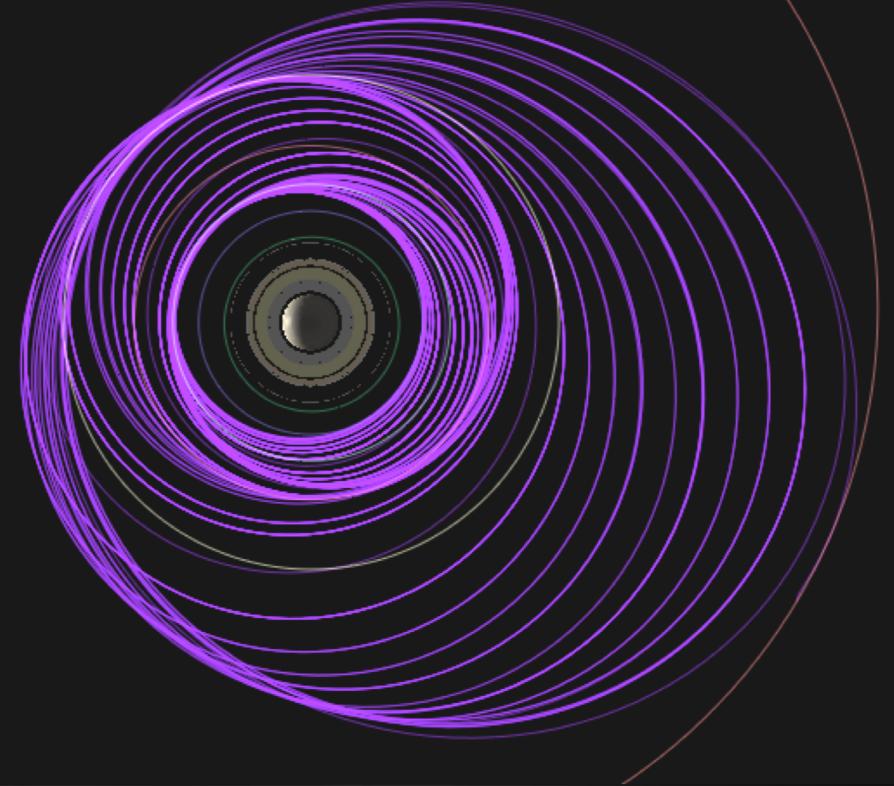


25% higher mass to Enceladus orbit, 2 years sooner, than chemical

REP concept (Radioisotope Electric Propulsion)



Low power magnetically-shielded Hall thruster



Ring-skimming tour concept at Saturn

